

Aire House  
12 Victoria Avenue  
Harrogate, HG1 1ED



Date 21/02/2022 11:26  
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Designed by Rob  
Checked by

Innovyze Source Control 2020.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	9.294	0.294	16.7	558.0	O K
30 min Summer	9.379	0.379	16.8	728.4	O K
60 min Summer	9.461	0.461	16.8	900.3	O K
120 min Summer	9.537	0.537	16.8	1061.6	O K
180 min Summer	9.574	0.574	16.8	1141.9	O K
240 min Summer	9.594	0.594	16.8	1187.4	O K
360 min Summer	9.612	0.612	16.8	1227.0	O K
480 min Summer	9.618	0.618	16.8	1238.8	O K
600 min Summer	9.615	0.615	16.8	1232.9	O K
720 min Summer	9.610	0.610	16.8	1222.7	O K
960 min Summer	9.599	0.599	16.8	1197.6	O K
1440 min Summer	9.571	0.571	16.8	1135.7	O K
2160 min Summer	9.522	0.522	16.8	1029.9	O K
2880 min Summer	9.473	0.473	16.8	924.5	O K
4320 min Summer	9.382	0.382	16.8	736.3	O K
5760 min Summer	9.309	0.309	16.8	587.6	O K
7200 min Summer	9.254	0.254	16.6	479.1	O K
8640 min Summer	9.216	0.216	16.3	403.1	O K
10080 min Summer	9.191	0.191	15.9	355.8	O K
15 min Winter	9.328	0.328	16.8	626.3	O K
30 min Winter	9.422	0.422	16.8	818.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	121.269	0.0	516.8	26
30 min Summer	79.695	0.0	687.5	41
60 min Summer	49.937	0.0	913.0	70
120 min Summer	30.267	0.0	1109.9	128
180 min Summer	22.297	0.0	1227.5	186
240 min Summer	17.851	0.0	1310.6	246
360 min Summer	12.957	0.0	1426.7	364
480 min Summer	10.330	0.0	1515.6	482
600 min Summer	8.659	0.0	1586.6	578
720 min Summer	7.492	0.0	1645.8	622
960 min Summer	5.959	0.0	1740.8	742
1440 min Summer	4.309	0.0	1873.7	998
2160 min Summer	3.110	0.0	2094.6	1396
2880 min Summer	2.466	0.0	2212.6	1792
4320 min Summer	1.775	0.0	2377.9	2556
5760 min Summer	1.405	0.0	2536.5	3280
7200 min Summer	1.171	0.0	2640.0	3960
8640 min Summer	1.008	0.0	2724.0	4592
10080 min Summer	0.889	0.0	2789.2	5248
15 min Winter	121.269	0.0	582.4	26
30 min Winter	79.695	0.0	772.2	40

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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
60 min Winter	9.514	0.514	16.8	1012.4	O K
120 min Winter	9.599	0.599	16.8	1197.4	O K
180 min Winter	9.642	0.642	16.8	1292.0	O K
240 min Winter	9.666	0.666	16.8	1347.7	O K
360 min Winter	9.690	0.690	16.8	1402.3	O K
480 min Winter	9.701	0.701	16.8	1426.4	Flood Risk
600 min Winter	9.703	0.703	16.8	1430.3	Flood Risk
720 min Winter	9.699	0.699	16.8	1421.0	O K
960 min Winter	9.680	0.680	16.8	1377.5	O K
1440 min Winter	9.638	0.638	16.8	1284.1	O K
2160 min Winter	9.566	0.566	16.8	1124.2	O K
2880 min Winter	9.490	0.490	16.8	962.5	O K
4320 min Winter	9.355	0.355	16.8	680.1	O K
5760 min Winter	9.255	0.255	16.6	480.2	O K
7200 min Winter	9.196	0.196	16.1	364.8	O K
8640 min Winter	9.173	0.173	14.3	320.2	O K
10080 min Winter	9.156	0.156	12.8	289.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
60 min Winter	49.937	0.0	1024.6	68
120 min Winter	30.267	0.0	1244.7	126
180 min Winter	22.297	0.0	1375.9	184
240 min Winter	17.851	0.0	1468.6	242
360 min Winter	12.957	0.0	1597.7	358
480 min Winter	10.330	0.0	1696.3	472
600 min Winter	8.659	0.0	1774.7	584
720 min Winter	7.492	0.0	1839.8	692
960 min Winter	5.959	0.0	1943.5	888
1440 min Winter	4.309	0.0	2085.2	1092
2160 min Winter	3.110	0.0	2347.2	1532
2880 min Winter	2.466	0.0	2479.7	1940
4320 min Winter	1.775	0.0	2667.7	2688
5760 min Winter	1.405	0.0	2842.2	3352
7200 min Winter	1.171	0.0	2958.6	3896
8640 min Winter	1.008	0.0	3053.6	4584
10080 min Winter	0.889	0.0	3129.1	5336

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 2.519

Time (mins) Area			Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	0.840	4	8	0.840	8	12	0.840

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Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 9.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	1800.0	1.000	2500.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0184-1680-1000-1680
Design Head (m)	1.000
Design Flow (l/s)	16.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	184
Invert Level (m)	9.000
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	16.8
Flush-Flo™	0.325	16.8
Kick-Flo®	0.706	14.2
Mean Flow over Head Range	-	14.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.5	1.200	18.3	3.000	28.4	7.000	42.7
0.200	16.1	1.400	19.7	3.500	30.6	7.500	44.2
0.300	16.8	1.600	21.0	4.000	32.6	8.000	45.6
0.400	16.7	1.800	22.2	4.500	34.5	8.500	46.9
0.500	16.3	2.000	23.4	5.000	36.3	9.000	48.3
0.600	15.8	2.200	24.5	5.500	38.0	9.500	49.5
0.800	15.1	2.400	25.5	6.000	39.7		
1.000	16.8	2.600	26.5	6.500	41.2		